TULEVICHYUS. V.V. [Tulevičius, V.V.], aspirant

Topographic maps for use in draining lands with excessive soil moisture in the Lithuanian S.S.R. Izv.vys.ucheb.zav., geod. i aerof. no.6: 67-71 '58. (MIRA 12:1)

1. Moskovskiy institut inzhenerov geodezii, aerofotos"yemki i kartografii.
(Lithuania--Maps, Topographic) (Drainage)

3(2)

AUTHOR: Tulevichyus, V. V., Junior Research Assistant SOV/154-58-6-7/22

TITLE: Topographic Maps for the Drainage of Territories in the Litva SSR With Excessive Moisture Content (Topograficheskiye karty dlya tseley osusheniya izbytochno uvlazhnennykh zemel' Litovskoy SSR)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Geodeziya i aerofotos"yemka, 1958, Nr 6, pp 67-71 (USSR)

ABSTRACT: About 25000 km^2 or 38% of all territories in Lithuania have a permanent or periodical surplus moisture. The productive capacity of these territories is 2-5 times smaller than in regions with normal moisture content. It is planned for 1956-60 to drain 7240 km^2, i.e. 11% of the total area of Lithuania. The marshy areas comprise 5% of the total area in Lithuania. The principal means for the drainage of these territories with increased moisture content is the drainage by means of ceramic tubes. Half of the area is drained by an open network of canals. In future, the canals are to be replaced by drainage. Topographic maps are required for this purpose. 1) Topographic maps

Card 1/3

for draining the territories by means of closed drainage. In 1958, the "Technical Conditions for Carrying Out the Topographic-Geodetical Work for a Detailed Drainage of Land Parcels up to a Surface of 5 km^2" were published by the Glavnoye Upravleniye vodnogo khozyaystva MSKh SSSR (Main Administration of Water Economy MSKh USSR). According to this prescription, the topographic survey is carried out on a scale of 1 : 5000 with contour lines every 0.5 m. On the basis of the survey, a plan at 1 : 2000 is completed. The demands to topographic maps resulting from the operational conditions for an amelioration drainage system are pointed out here. It is stated that for projecting a drainage net it is sufficient to have a relief map for obtaining individual markings with an error not over $\pm$ 0.25 m, and an error of inclination of $\pm$ 0.22%. Such accuracy is obtained by a relief survey with contour lines every 0.5 m. - The accuracy of the outlines on the map is investigated here. It is found that for the outlines of the region an accuracy with a maximum error of 4 m is sufficient. This is guaranteed

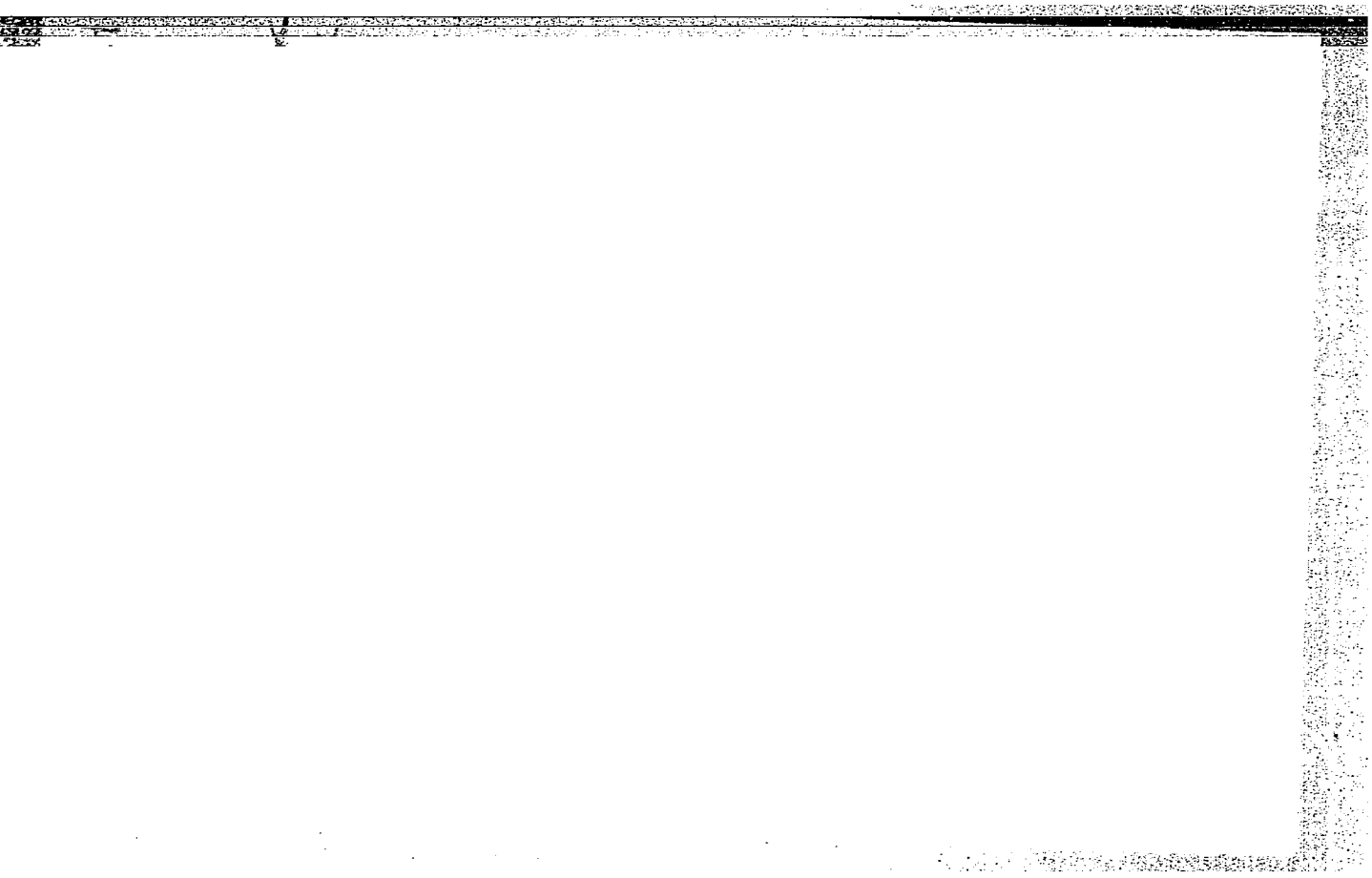
APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757410017-8"

Topographic Maps for the Drainage of Territories in the Litva SSR With Excessive Moisture Content

by the "Specifications for Topographic Surveys on the Scale of 1 : 5000 and 1 : 2000" published in 1955. 2) Topographic map for draining the territories by means of open canals. Such drainage is carried out in marshy areas and in regions with mineral waters. For this, a map of 1 : 10000 with contour lines every 1 m is sufficient. Such survey is carried out in Lithuania. The mean deviation squares vary between ± 0.15 and ± 0.20 m. There are 1 table and 5 Soviet references.

ASSOCIATION: Moskovskiy institut inzhenerov geodezii, aerofotos"yemki i kartografii (Moscow Institute for Geodesy, Aerial Photography and Cartography Engineers)

SUBMITTED: July 15, 1958



APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757410017-8"

BURTELOV, M.G., inzh.; TULIGLOVICH, P.T., inzh.

Characteristics of the maintenance of tracks with asbestos ballast. Put' i put.khoz. 7 no.8:29-30 '63. (MIRA 16:9)

1. Zamestitel' nachal'nika Kargatskoy distantsii puti Zapadno-Sibirskoy dorogi (for Burtelov). 2. Barabinskaya distantsiya Zapadno-Sibirskoy dorogi (for Tuliglovich).
(Railroads—Maintenance and repair)

TULIGLOVICH, P.T., inzh.

Device for rail fastening. Put' i put.khoz. 5 no.9:29 S '61.
(MIRA 14:10)

1. Barabinskaya distantsiya, Zapadno-Sibirskoy dorogi.
(Railroads--Rails--Defects)

KAMMAL, Uno; TORMISTO, Vello; TULIK, A. [translator]; VASIL'YEV, P., red.; VEBER, Kh., tekhn. red.

[Tallinn] Tallin. Tallin, Estonskoe gos. izd-vo, 1960. 78 p. (MIRA 14:11)

(Tallinn)

VAREP, Endel'; TULIK, A., red.; VEBER, T., tekhn. red.

Tartu. Tallinn, Estonskoe gos. izd-vo, 1960. 52 p. (MIRA 15:3)

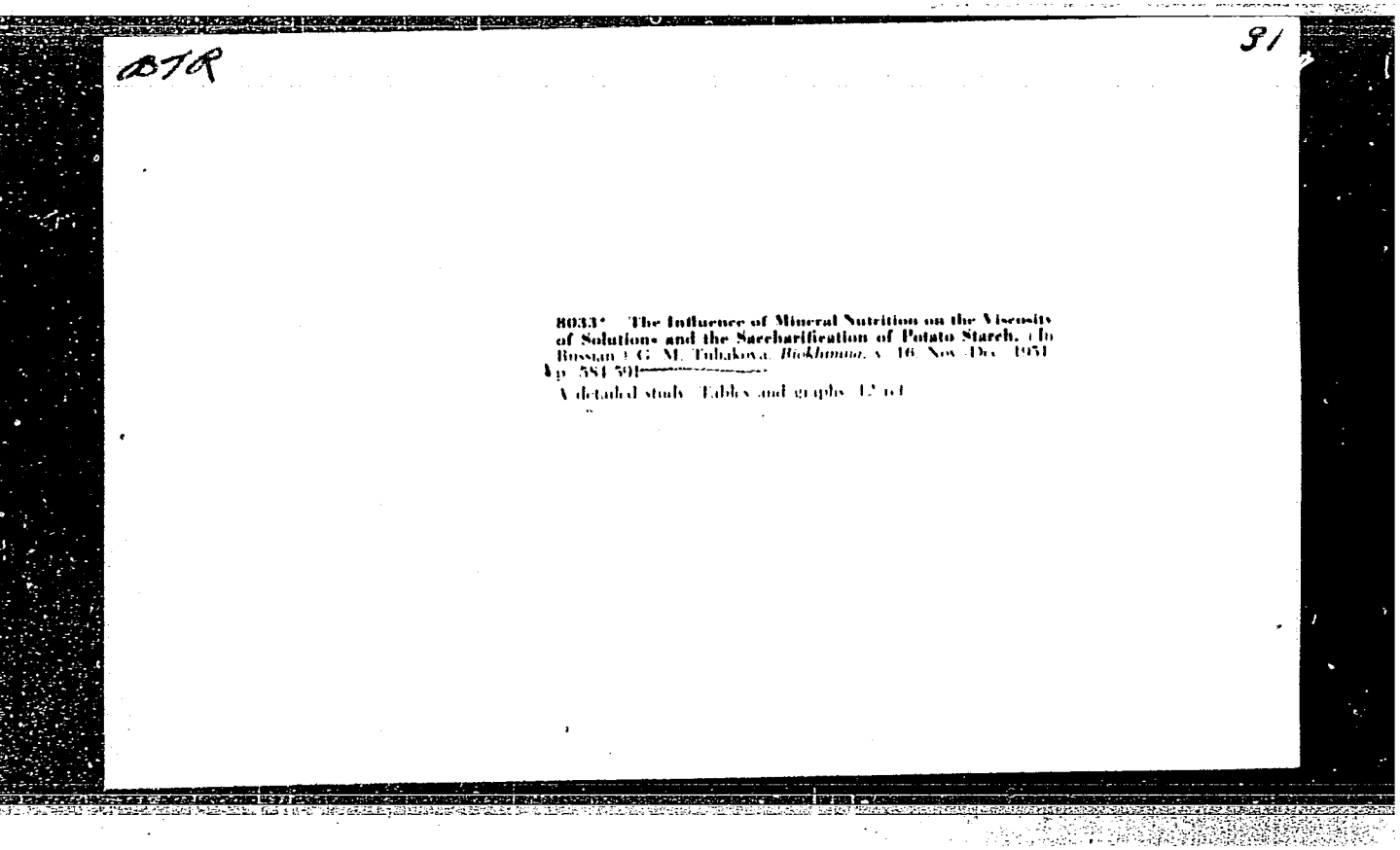
(Tartu—Description)

GRUZDEV, G.S., dotsent, kand. sel'skokhoz. nauk; TULIKOV, A.M., assistent

Increasing the effectiveness of chemical weed control in grain fields. Izv. TSKHA no.1:136-148 '64.

(MIRA 17:4)

1. Kafedra zemledeliya Moskovskoy ordena Lenina sel'skokhozyaystvennoy akademii imeni Timiryazeva.



OTR

91

8033* The Influence of Mineral Nutrition on the Viscosity of Solutions and the Saccharification of Potato Starch. (In Russian.) G. M. Tukakova. *Biokhimiia*, v. 16, Nov.-Dec., 1951, pp. 584-591.

A detailed study. Tables and graphs. 17 ref.

GRUZDEV, G.S., kand.sel'skokhozyaystvennykh nauk, dotsent; TULIKOV, A.M., aspirant

Cultivation practices and chemical measures for controlling offset weeds. Izv. TSKHA no.3:23-38 '61. (MIRA 14:9)
(Weed control)

CHEKMAREV, Yakov Fedorovich; TULIKOV, Boris Alekseyevich; NIKITINA, N.I., red.

[Arithmetic for normal schools] Arifmetika dlia pedagogicheskikh uchilishch. Izd.8. Moskva, Prosveshchenie, 1965. 302 p. (MIRA 18:6)

TULIKOV, S.

We are for peace; a song. p. 9.
(LUDOVY ROZHLAS., Vol. 9, no. 18, Apr. 1953, Czechoslovakia)

SO: Monthly List of East European Accessions, Vol. 2 #8, Library of Congress, August 1953, Uncl.

IOFFE, S.T.; POPOV, Ye.M.; VATSURO, K.V.; TULIKOVA, Ye.K.; KABACHNIK, M.I., akademik

Keto cis-trans-enol equilibrium of 3-alkylacetylacetones. Dokl. AN SSSR 144 no.4:802-805 Je '62. (MIRA 15:5)

1. Institut elementoorganicheskikh soyedineniy AN SSSR.
(Acetone) (Isomerization)

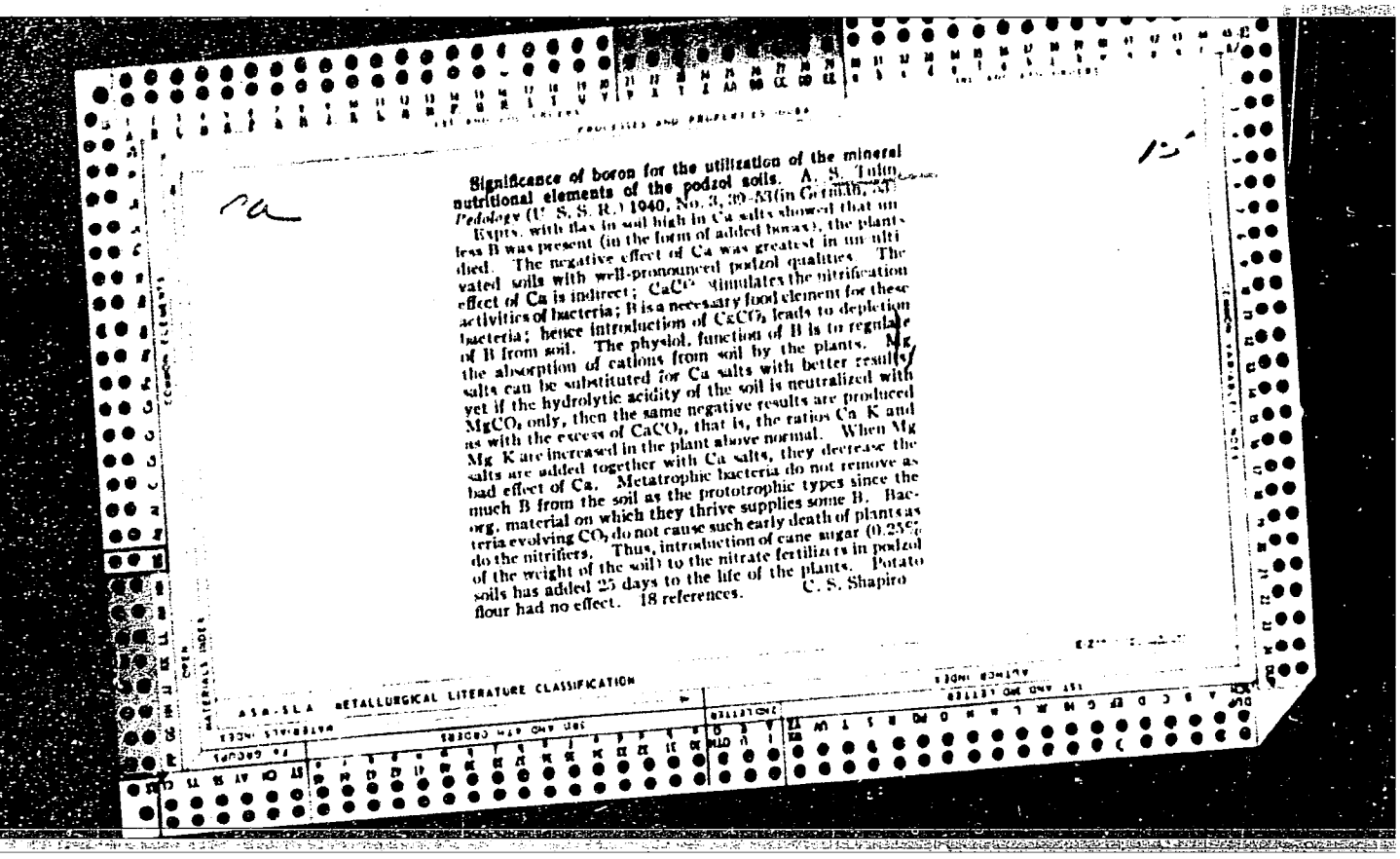
MICHALSKI, Jan; TULIMOWSKI, Zdzislaw

Organophosphorus compounds of sulfur and selenium. Pt.24.
Rocz chemii 36 no.12:1781-1785 '63.

1. Department of Organic Chemistry, Technical University, Lodz.

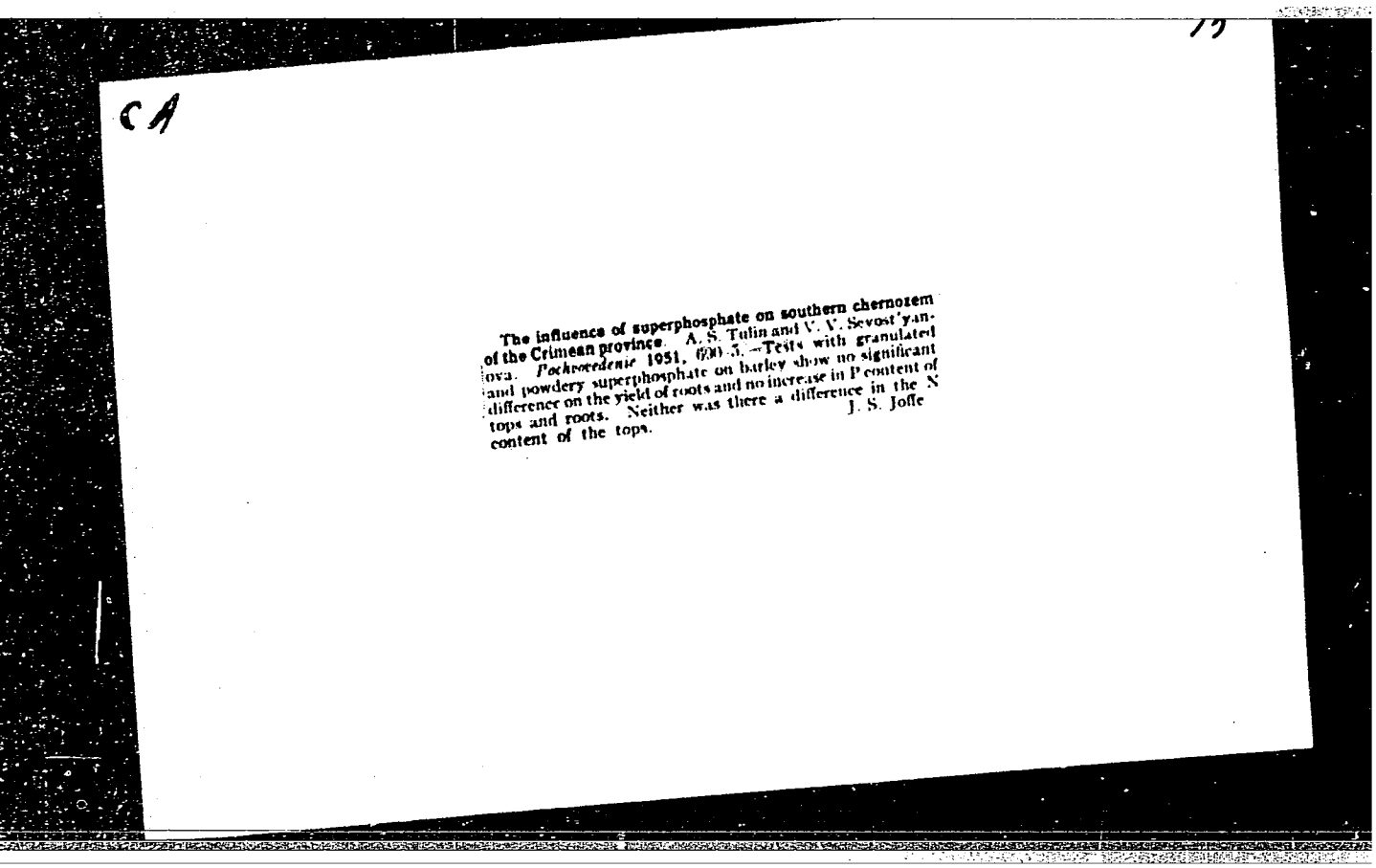
BULOVSKIY, Pavel Ivanovich; POVALYAYEV, Andrey Vladimirovich; SOKOLOV, A.I., inzhener, redaktor; TULIN,A.S., redaktor; ZAVATSKIY,B.F., inzhener, retsenzent; CHISTYAKOVA,A.V., tekhnicheskiy redaktor

[Technology of installing electric measuring instruments] Tekhnologiia sborki elektroizmeritel'nykh priborov. Moskva, Gos.izd-vo obor. promyshl., 1955. 303 p. (MLRA 9:2)
(Electric meters)



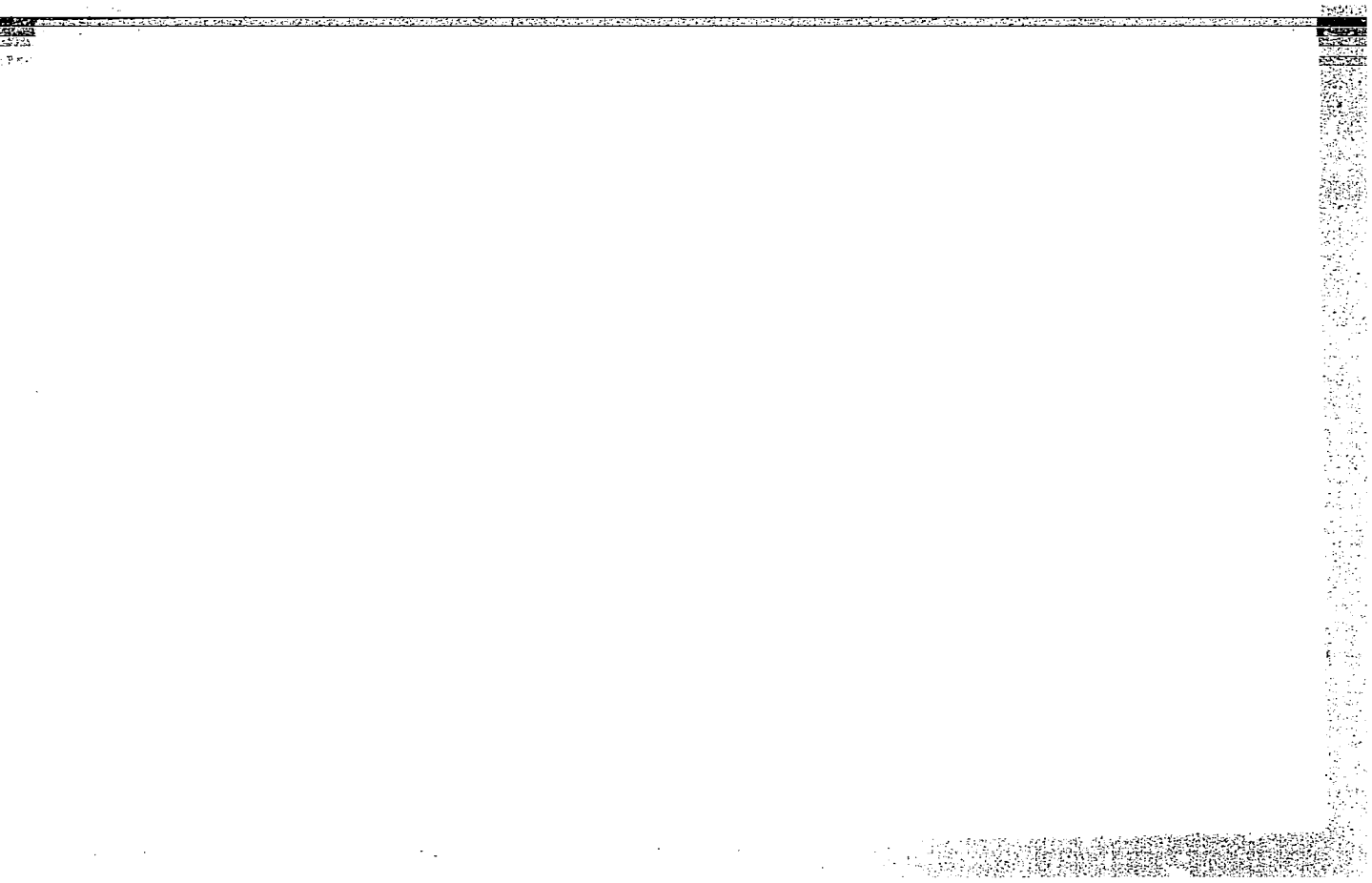
Significance of boron for the utilization of the mineral nutritional elements of the podzol soils. A. S. Tulin. *Pedology* (U. S. S. R.) 1940, No. 3, 39–53 (in German). Expts. with flax in soil high in Ca salts showed that unless B was present (in the form of added borax), the plants died. The negative effect of Ca was greatest in unlimited soils with well-pronounced podzol qualities. The effect of Ca is indirect; $CaCO_3$ stimulates the nitrification activities of bacteria; B is a necessary food element for these bacteria; hence introduction of $CaCO_3$ leads to depletion of B from soil. The physiol. function of B is to regulate the absorption of cations from soil by the plants. Mg salts can be substituted for Ca salts with better results, yet if the hydrolytic acidity of the soil is neutralized with $MgCO_3$ only, then the same negative results are produced as with the excess of $CaCO_3$, that is, the ratios Ca K and Mg K are increased in the plant above normal. When Mg salts are added together with Ca salts, they decrease the bad effect of Ca. Metatrophic bacteria do not remove as much B from the soil as the prototrophic types since the org. material on which they thrive supplies some B. Bacteria evolving CO_2 do not cause such early death of plants as do the nitrifiers. Thus, introduction of cane sugar (0.25% of the weight of the soil) to the nitrate fertilizers in podzol soils has added 25 days to the life of the plants. Potato flour had no effect. 18 references.

C. S. Shapiro



CA

The influence of superphosphate on southern chernozem of the Crimean province. A. S. Tulin and V. V. Sevost'yanova. *Pochvovedenie* 1951, 690-5.—Tests with granulated and powdery superphosphate on barley show no significant difference on the yield of roots and no increase in P content of tops and roots. Neither was there a difference in the N content of the tops. J. S. Joffe



APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001757410017-8"

TULIN, A. S.

TULIN, A. S. "The Phosphate Conditions of the soils of the step Region of the Crimea and the Fertilization of Field Crops." Soil Inst imeni V. V. Dokuchayev. Acad Sci USSR. Moscow, 1956
(For the Degree of Doctor in Agricultural Science)

So: Knizhnaya Letopis' No. 18, 1956

SUBJECT : Cultivated Plants. Grains. Leguminous Grains. Tropical Cereals.

ABS. JOUR : Ref Zhur - Biologiya, No.5 , 1959, No. 20216

AUTHOR : Tulin, A.S.; Sevast'yanova, V.V.
INST. : Crimean Agr. Institute.
TITLE : Phosphorus Nutrition of Winter Wheat on the Southern Chernozem and Dark Chestnut Soils of the Crimean Steppe.
ORIG. PUB.: Tr. Krym. s.-kh. in-ta 1957, No.5, 265-289

ABSTRACT : Field and laboratory studies were made in the years 1950-1952. A description is given of the object and methods of investigation, of agrometeorological conditions of the vegetation of winter wheat in 1950-1951, and data is presented on the effect of phosphorous fertilizers on above-ground accumulation and on the wheat yield, on root distribution and weight, and on the phosphorus uptake of winter wheat planted after fallow and various preceding

CARD: 1/2

COUNTRY :
CATEGORY : Cultivated Plants.

ABS. JOUR.: Ref Zhur -Biologiya, No. 5 , 1959, No. 20

Author :
INST. :
TITLE :

ORIG. PUB.:

ABSTRACT : crops on different soils. The basic need of phosphorus fertilization of winter wheat is established. The significance of the time and methods used in applying P_2 is comparatively elucidated, and it is recommended that row placement (with the seeds) of small doses of P_2 be utilized.
-- N.F. Kravtsova

CARD : 2/2

TULIN, A.S. (Moskva)

Generalization on conditions of proportion in electromagnetic systems. Avtom. i telem. 21 no.3:374-383 Mr '60. (MIRA 13:6)
(Electromagnets)

TUL'CHINSKIY, L.N.

Compact apparatus for determining the Curie point of small ferromagnetic bodies. Zav.lab. 26 no.2:232-233 '60. (MIRA 13:5)

1. Institut metallokeramiki i spetsial'nykh splavov Akademii nauk USSR.
(Ferromagnetism)

Country : USSR
Category : Soil Science. Fertilizers. Mineral Fertilizers. J

Abs Jour : RZhBiol., No 6, 1959, No 24647

Author :
Inst : Krymskaya Oblast State Agricultural Experimental Station.
Title : Tumulus Ashes as a Fertilizer.

Orig Pub : Tr. Krymsk. obl. gos. s.-kh. opytn. st., 1956, 2, 17-25

Abstract : Tumulus ashes, huge deposits of which were formed in antiquity in various parts of the Crimean steppes from the remains of steppe plants, grain straws and dung, contain 2.1-3.5 percent of K_2O and 1.0-1.5 percent of P_2O_5. For the Crimean soils, reacting negatively to K, it is only a phosphorus fertilizer

Card : 1/2

Country : USSR
Category : Soil Science. Fertilizers. Mineral Fertilizers. J

Abs Jour : RZhBiol., No 6, 1959, No 24647

Author :
Inst :
Title :

Orig Pub :

Abstract : and the dose should not exceed 1.5 t/ha. The total harvest increment of the most important crop-rotation cultivation - corn, winter wheat and winter barley - in one year consisted of 3.5 c of seed and 7.5 c of straw or 7.2 c of fodder units from one acre. -- N. N. Sokolov

Card : 2/2

COUNTRY : USSR
CATEGORY : Soil Science. Organic Fertilizers. J

ABS. JOUR. : RZhBiol., No. 3 1959, No. 10699

AUTHOR : Tulin, A. S.
INST. : Crimean State Agricultural Experiment Station
TITLE : Effectiveness of Manure in Crimean Steppe.

ORIG. PUB. : Tr. Krymsk. obl. gos. s.-kh. opytn. st., 1956, 2, 5-15

ABSTRACT : According to the results of the analyses at Crimean Experiment Station, manure kept in compact piles for 3± months, contains N - 0.47%, P_2O_5 - 0.16% and K_2O - 0.86%. Manure is chiefly a phosphorus fertilizer. During 1946-1954 field experiments, in the 10-field crop rotation, the increases in the yields of winter wheat on fallow and of corn from the direct action of manure (20 tons) and P_{60}, were almost identical on an average for a number

CARD: 1/3

COUNTRY :
CATEGORY : J

ABS. JOUR. : RZhBiol., No. 1959, No. 10699

AUTHOR :
INST. :
TITLE :

ORIG. PUB. :

ABSTRACT : centners/ha. The higher residual effect of manure is explained chiefly by the simultaneous action of N in manure. On spring barley, the residual effect of manure and P_2 applied under the predecessor winter crop, showed very weakly which is explained by the after-effect of fallow. Grasses grew poorly in these years and for the most part did not react to the fertilizers. Therefore, the aggregate increase in the yield of the grass-land link of the crop rotation is one half that of the cereal link. -- N. N. Sokolov

CARD: 3/3

24.2200

78167
SOV/103-21-3-13/21

AUTHOR: Tulin, A. S. (Moscow)

TITLE: Generalized Proportionality Conditions of Electromagnetic Systems (Geometry of Electromagnetic Systems)

PERIODICAL: Avtomatika i telemekhanika, 1960, Vol 21, Nr 3, pp 374-383 (USSR)

ABSTRACT: In the paper certain coefficients are defined which allow the investigation of features of various electromagnetic systems. The investigation is based on geometric and economic premises. The fundamental characteristic parameters of electromagnetic systems are: (1) the so-called "geometric constant" characterizing the electromagnetic energy accumulated by the system, determined in relative units by

$$\xi = \frac{1}{\sqrt[3]{Q^2}} \frac{S_M S_C}{L_M I_C}; \qquad (7)$$

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(2) the "geometric function" given by

$$\gamma = \xi \sqrt[3]{Q^2}, \qquad (8)$$

which serves to minimize the volume of active materials. Here S_M, S_C are cross sections and L_M, L_C are average lengths, of the magnetic circuit and of the winding, respectively; Q is the sum of volumes of active materials. Analysis is carried on for the system shown in Fig. 2. The analysis is based on Eqs. (7) and (8). Results obtained are given in Fig. 3 showing the optimum geometric forms of the investigated system.

Generalized Proportionality Conditions of Electromagnetic Systems (Geometry of Electromagnetic Systems)

78167
SOV/103-21-3-13/21

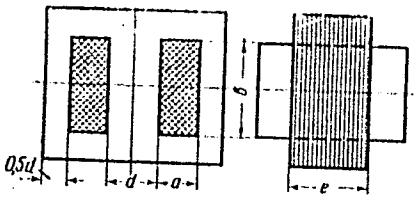
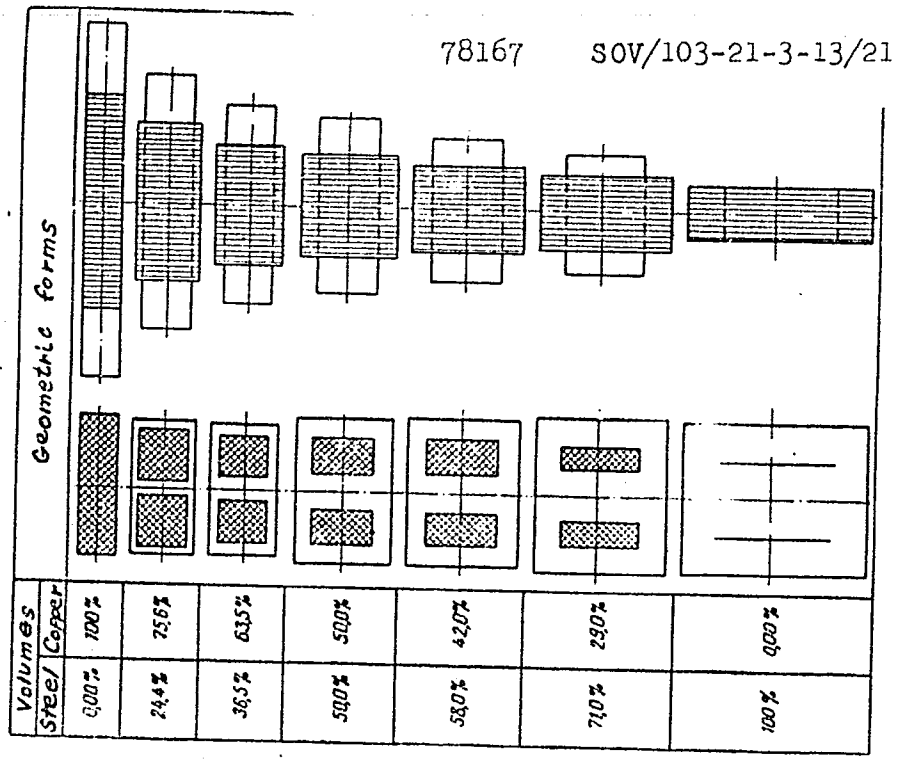


Fig. 2. Geometric shape of the three-core electromagnetic system.

Some considerations from the economy point of view are given. In conclusion the author says that this method gives a continuous series of optimum versions of geometric shapes, for any electromagnetic system. The sequence in this

Card 3/5



Card 4/5

Fig. 3. Successive series of optimum geometric forms of three-core electromagnetic system at various relations between the winding and the volume of magnetic circuit.

series depends on the relation between volumes of the winding and the magnetic circuit.

SUBMITTED: November 5, 1959

TULIN, A.S.

Induction watt-hour meter equipped with a cylindrical rotor. (MIRA 12:1)
Inform.-tekhn. sber. MKP no.8:23-30 '58.

1. Vsesoyuznyy nauchno-issledovatel'skiy institut elektropromyshlennosti.
(Watt-hour meter)

Name: TULIN, Aleksandr Stepanovich

Dissertation: Phosphate condition of soils of the Crimean steppe and fertilization of field crops

Degree: Doc Agr Sci

Affiliation: Crimean Agr Inst

Defense Date, Place: 9 May 56, Council of Soil Inst imeni Dokuchayev, Acad Sci USSR

Certification Date: 6 Jul 57

Source: BMVO 18/57

1. YULIN, I.

2. USSR (600)

4. Scaffolding

7. Interior Scaffolding on metal suspension supports. Sel'. stroi. 7 no. 6 1952

9. Monthly List of Russian Accessions. Library of Congress March 1953. Unclassified.

TULIN, M., polkovnik, kand. filosofskikh nauk

Social nature and purpose of the army of a socialist state.
Komm. Vooruzh. Sil 5 no.2:45-50 Ja '65.
(MIRA 18:3)

MILYAVSKIY, Il'ya Osipovich, kandidat sel'skokhozyaystvennykh nauk; RIVKIND, T., redaktor; TULIN, N., redaktor; ZUBRILINA, Z.P., tekhnicheskiy redaktor

[T.S.Mal'tsev, collective farmer and scientist] Kolkhoznik-uchenyi T.S.Mal'tsev. Izd. 4-oe, dop. Moskva, Gos. izd-vo selkhoz.lit-ry, 1956. 143 p. (MLRA 10:1)
(Mal'tsev, Terentii Semenovich, 1895-)

KAYBICHEVA, M.N.; FADEYEVA, N.I.; TULIN, N.A.; SHATALOV, M.I.

Basic refractory wastes are a valuable raw material. Metallurg 6 no. 1:18-20 '61. (MIRA 14:1)

1. Vostochnyy institut ogneuporov i Chelyabinskiy metallurgicheskiy zavod.

(Refractory materials)

KAPEL'NITSKIY, V.G.; SHVED, F.I.; KARTSEV, M.A.; TULIN, N.A.; POZDEYEV, N.P.; SERGEYEV, A.B.; MERENISHCHEVA, I.I.; KALININA, Z.M.; POZDNYAKOV, M.V. Prinimali uchastiye: KUZOVATOV, V.N.; MAKSUTOV, R.F.; MYSINA, G.Ye.; SHELGAYEVA, A.V.; ZHIVICHKIN, L.A.; GAYDUK, Yu.A.; GALYAN, V.S.; SOSKOV, D.A.; KHMELEV, I.I.; PARABINA, G.I.

Making steel and alloys in vacuum furnaces. Stal' 23 no.4:325-328 Ap '63. (MIRA 16:4)
(Vacuum metallurgy) (Electric furnaces)

ACC NR: AP5023088 SOURCE CODE: UR/0125/65/000/009/0077/0078

AUTHOR: Privalov, N. T. (Engineer); Tulin, N. A. (Engineer); Medovar, B. I. (Doctor of technical sciences); Maksimovich, B. I. (Candidate of technical sciences)

ORG: none

TITLE: Quality and production cost of DI-1 and EI961 steels melted in open-arc, vacuum-arc, or electroslag furnaces

SOURCE: Avtomaticheskaya svarka, no. 9, 1965, 77-78

TOPIC TAGS: steel, heat resistant steel, steel melting, arc melting, vacuum arc melting, electroslag melting/20Kh15N3MA steel, 13Kh12N2VMFA steel

ABSTRACT: The quality and production cost of DI-1 (20Kh15N3MA) and EI961 (13Kh12N2VMFA) heat-resistant steels melted in open-arc, vacuum-arc, or electroslag furnaces have been compared. It was found that vacuum-arc and electroslag-melted ingots have a dense, uniform structure without the segregations and other defects observed in metal produced in open-arc furnaces. Electroslag melting reduces sulfur content. Not much difference was found in the chemical composition and mechanical properties of steels melted by different methods. The production cost of electroslag-melted and vacuum-arc steels was 38—45% and 248—275% higher, respectively, than that of conventionally melted steels. The quality of electroslag-melted steels is

Card 1/2 UDC: 621.791.9

ACC NR: AP5023088

not inferior and in some respects is even superior to that of vacuum-arc melted steel. Thus, it is more economical to use electroslag melting for DI-1 and EI961 steels. Orig. art. has: 2 tables. [ND]

SUB CODE: MM/ SUBM DATE: none/ ORIG REF: 000/ OTH REF: 000/ ATD PRESS: 4123

Card 2/2

BEZCHASOV, S.V.; KADARMETOV, Kh.N.; CHARUSHNIKOVA, G.V.; KRICHEVETS, R.B.; FOMENKO, Yu.G.; TULIN, N.A.; POZDEYEV, N.P.; SERGEYEV, A.B.

Vacuum treatment of liquid ferrochromium. Stal' 25 no.8:820-823 S '65. (MIRA 18:9)

1. Chelyabinskiy nauchno-issledovatel'skiy institut metallurgii i Chelyabinskiy metallurgicheskiy zavod.

S/131/60/000/04/10/015
B015/B008

AUTHORS: Kaybicheva, M.N., Tulin, N.A., Bastrikov, N.F., Fadeyeva, N.I.

TITLE: Wall-blocks of Electric Steel-melting Furnaces From Scrap of Magnesite-chromite Bricks

PERIODICAL: Ogneupory, 1960, No. 4, pp. 186-188

TEXT: Experiments with these wall-blocks which were carried out at the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant) are described in the paper under review. The charge was produced by crushing scrap of used magnesite-chromite- and chrome-magnesite bricks. The chemical composition of the experimental charges is given in table 1 and their granulation in table 2. Various grades of steel were smelted in the furnace with magnesite-chromite wall-blocks, the temperature of the metal before tapping being between 1560 and 1640°. It is stated in conclusion that the stability of the magnesite-chromite wall-blocks rammed from scrap is not inferior to that of wall-blocks made from magnesite powder. Various other furnace parts can also be produced from ground scrap of used bricks. The consumption of metallurgical

Card 1/2

Wall-blocks of Electric Steel-melting Furnaces From Scrap of Magnesite-chromite Bricks

S/131/60/000/04/10/015
B015/B008

magnesite powder may be reduced by using scrap. There are 2 tables.

Card 2/2

TULIN, M.A.; POZDEYEV, N.P.; YARTSEV, M.A., SERGEYEV, A.B.; ZHAVICHKIN, L.A., elektrik; GAYDUK, Yu.A., mekhanik

Adopting the vacuum induction furnace OKB-571-B. Metallurg 8 no.4:24-26 Ap '63. (MIRA 16:3)

(Electric furnaces—Design and construction)

YARTSEV, M.A.; LANDE, P.A.; TULIN, N.A.; NOVOZHILOV, N.G.

Service of electric furnace linings at the Chelyabinsk Metallurgical Plant. Stal' 23 no.5:429-432 My '63. (MIRA 16:5)
(Electric furnaces--Design and construction)

KAYBICHEVA, M.N.; MAR'YEVICH, N.I.; TULIN, N.A.; SMAKOTIN, I.V.; LANDE, P.A.; TEREKHINA, P.Ya.

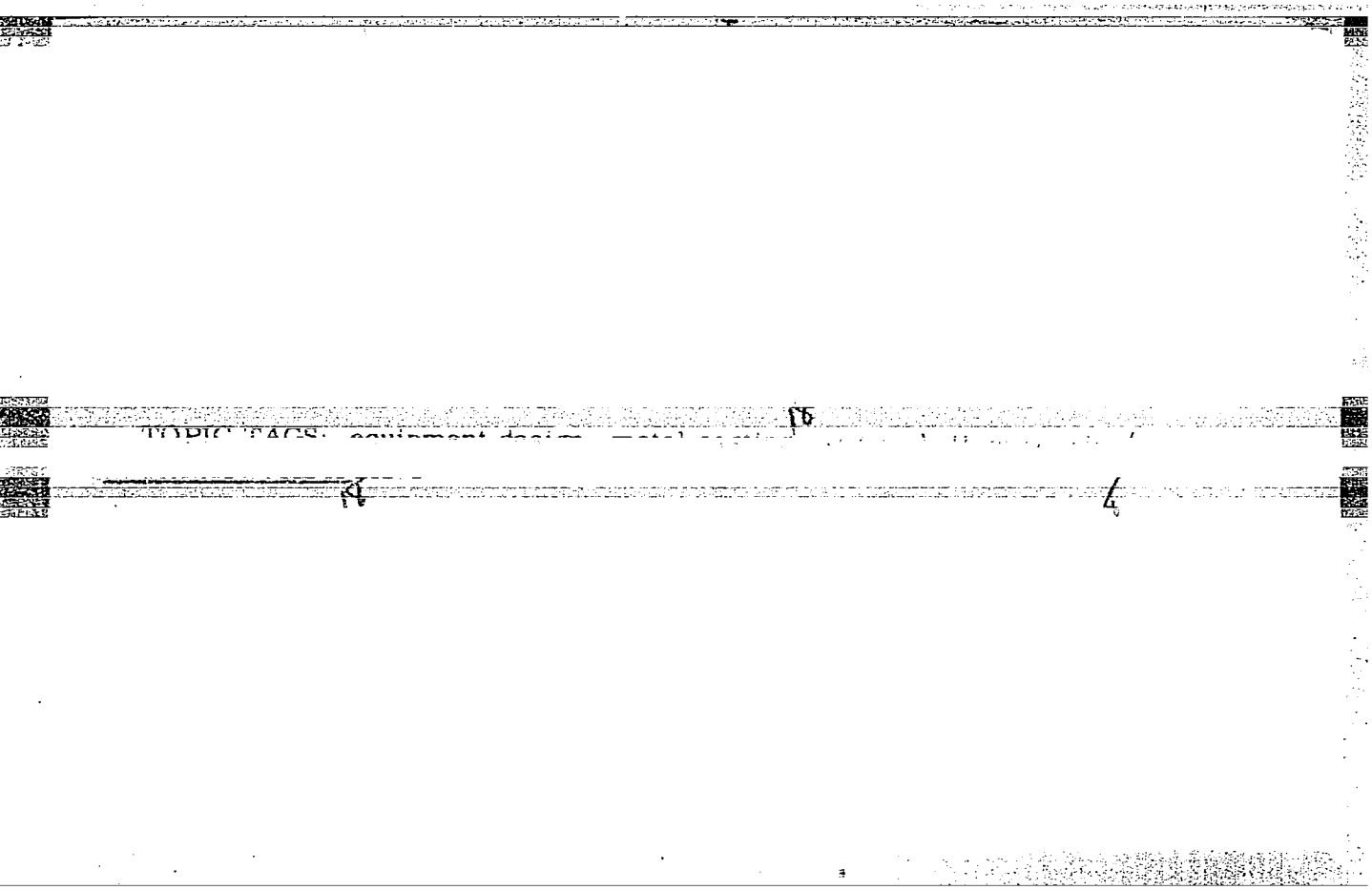
Service of unburned magnesite-chromite adapter bricks in electric furnace walls. Metallurg 7 no.8:16-18 Ag '62. (MIRA 15:9)

1. Vostochnyy institut ogneuporov i Chelyabinskiy metallurgicheskiy zavod.
(Electric furnaces) (Refractory materials)

KEYS, N.V.; GOLIKOV, Ye.S.; TULIN, N.A.; KOKAREV, N.I.; ZHUKOV, D.G.

"Manufacture of steel in electric furnaces" by A.D. Kramarov. Stal' 22 no.1:42 Ja '62. (MIRA 14:12)

1. Chelyabinskiy metallurgicheskiy zavod i Ural'skiy institut chernykh metallov.
(Steel--Electrometallurgy)



handle 8. Air is forced out of the trumpet and the mold, the stopper is opened

S/133/61/000/007/007/017
A054/A129

AUTHORS: Yartsev, M. A., Tulin, N. A., Bastrikov, N. F.

TITLE: Use of concentrate instead of ferrotungsten in the ChMZ

PERIODICAL: Stal', no. 7, 1961, 613 - 614

TEXT: When the metal bath is alloyed with ferrotungsten containing 70 - 73% tungsten, the quantity of tungsten that can be recovered from the bath is 85 - 95%, depending on the steel composition. The great losses in tungsten are due to its high specific gravity (19.32) and high melting point (about 3,380°C). Even at the maximum temperature of the molten metal tungsten will not melt entirely and part of it settles on the bottom of the bath. In order to reduce tungsten losses, tests were carried out in the Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant) with the cooperation of M. I. Shatalov, P. I. Puzikov, T. A. Broslavskaya and N. T. Privalov to try out replacement of ferrotungsten by a tungsten concentrate. The test meltings were made in a 5-ton arc furnace, the concentrate was added either during melting or in the charge. The latter method was found more efficient, both with regard to operational conditions and the utilization of tungsten, because when the concentrate is added to the charge tungsten can be re-

Card 1/3

Use of concentrate instead of ferrotungsten in the ChMZ

duced from wolframite during the melting of the bath. As reducing agent silicochrome '50' (49.2% Si and max. 30% Cr) was used, the charge consisted of 0.5 - 0.7% C, 2.70% Cr, 8.40% W and 0.60% Si, as prescribed for 3Kh2V8 (3Kh2V8) type steels. On the bottom of the bath 250 kg lime was added, next 400 - 500 kg ball-bearing steel scrap, low-carbon waste from the rolling shop, silicochrome, then again ball-bearing steel waste, and at the edge of the burden the tungsten concentrate. The melting of 3Kh2V8 steel takes 3 hours and 20 minutes. The finished metal contained: 0.33% C, 0.24% Mn, 0.23% Si, 0.017% S, 0.023% P, 2.34% Cr, 0.17% Ni, 8.36% W and 0.43% V. At a power-consumption of 686 kwh/t 5,040 tons of good quality steel were produced. The tungsten-concentrate has a high sulfur content (0.55 - 0.65%) which can be lowered by skimming part of the slag in the reduction period for 30 - 40 minutes after refining starts and adding fresh slag or by processing the slag with aluminum powder. The phosphorus content of the steel produced with the concentrate is lower than that of conventional steel, because the wolframite concentrate contains less phosphorus than ferrotungsten. The recovery of tungsten is less efficient when the carbon content decreases during smelting, it also depends on the excess amount of silicon and on the way in which the concentrate is fed into the bath. The use of wolframite concentrate instead of ferrotungsten re-

Use of concentrate instead of ferrotungsten in the ChMZ

duces the cost of 1 ton of 3Kh2V8 steel by 44 rubles and 95 kopecks (new currency). If the new method is further improved, smelting time can be reduced by 10 - 15 minutes (which saves electric power), while all the tungsten can be recovered. The metal produced with the concentrate corresponds to the standards. The method is already applied on an industrial scale.

Card 3/3

PRIVALOV, N.T.; YARTSEV, M.A.; TULIN, N.A.

Improving the technology of producing DI-1 steel. Stal' 23 no.5:426-429 My '63. (MIRA 16:5)
(Steel, Stainless--Electrometallurgy)

S/133/63/000/004/002/011
A054/A126

AUTHORS: Kapel'nitskiy, V. G., Shved, F. I., Yartsev, M. A., Tulin, N. A., Pozdeyev, N. P., Sergeyev, A. B. Merenishcheva, I. I., Kalinina, Z. M., Pozdnyakov, M. V.

TITLE: Melting of steel and alloys in vacuum furnaces

PERIODICAL: Stal', no. 4, 1963, 325 - 328

TEXT: ШХ 15 (ShKh15) and Х20Н80 (Kh20N80) grade steels often display spotty liquation, bright streaks, and bright skins. Tests for eliminating these defects were carried out by V. N. [illegible] [illegible], [illegible] [illegible], [illegible], [illegible] Balyan, [illegible], [illegible] [illegible], G. I. Pan[illegible] et al. To [illegible] the rotating movement of the liquid metal, the circuit scheme was [illegible] under the control of I. D. Pinchuk, Candidate of Technical Sciences and upon the [illegible] of the NIIM (Chelyabinsk Scientific Research Institute of Metallurgy) all [illegible] parts were eliminated from the electric system [illegible]

Card 1/3

Melting of steel and alloys in vacuum furnaces

3/133/63/000/004/002/011
A054/A126

the current system of the arc a negative reversed connection was realized for generator-induction. The arc was

Card 2/3

Melting of steel and alloys in vacuum furnaces

S/133/63/000/004/002/011
A054/A126

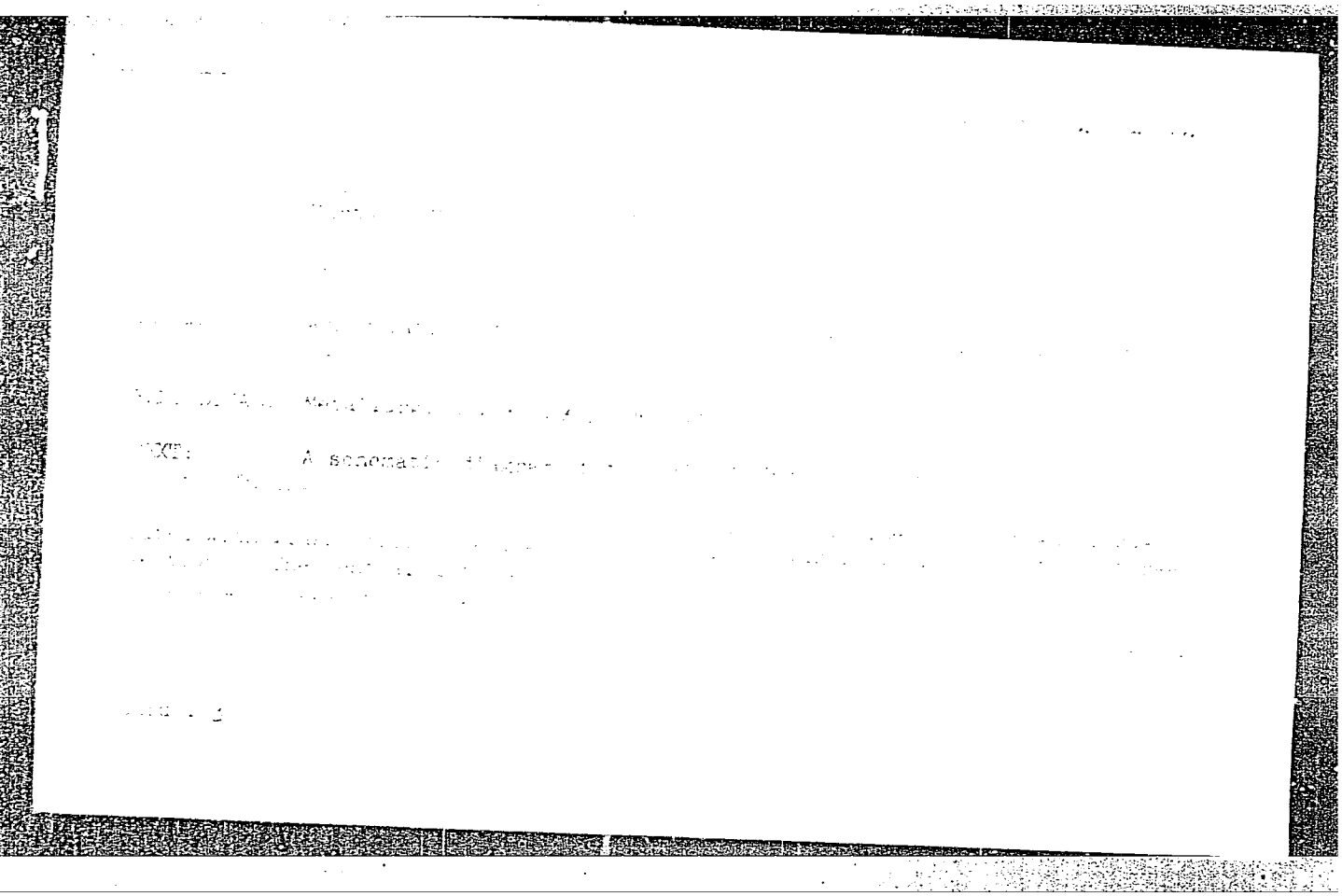
of the reduction of the alloys on their hot [illegible] in forging was [illegible]. The forging properties were [illegible]

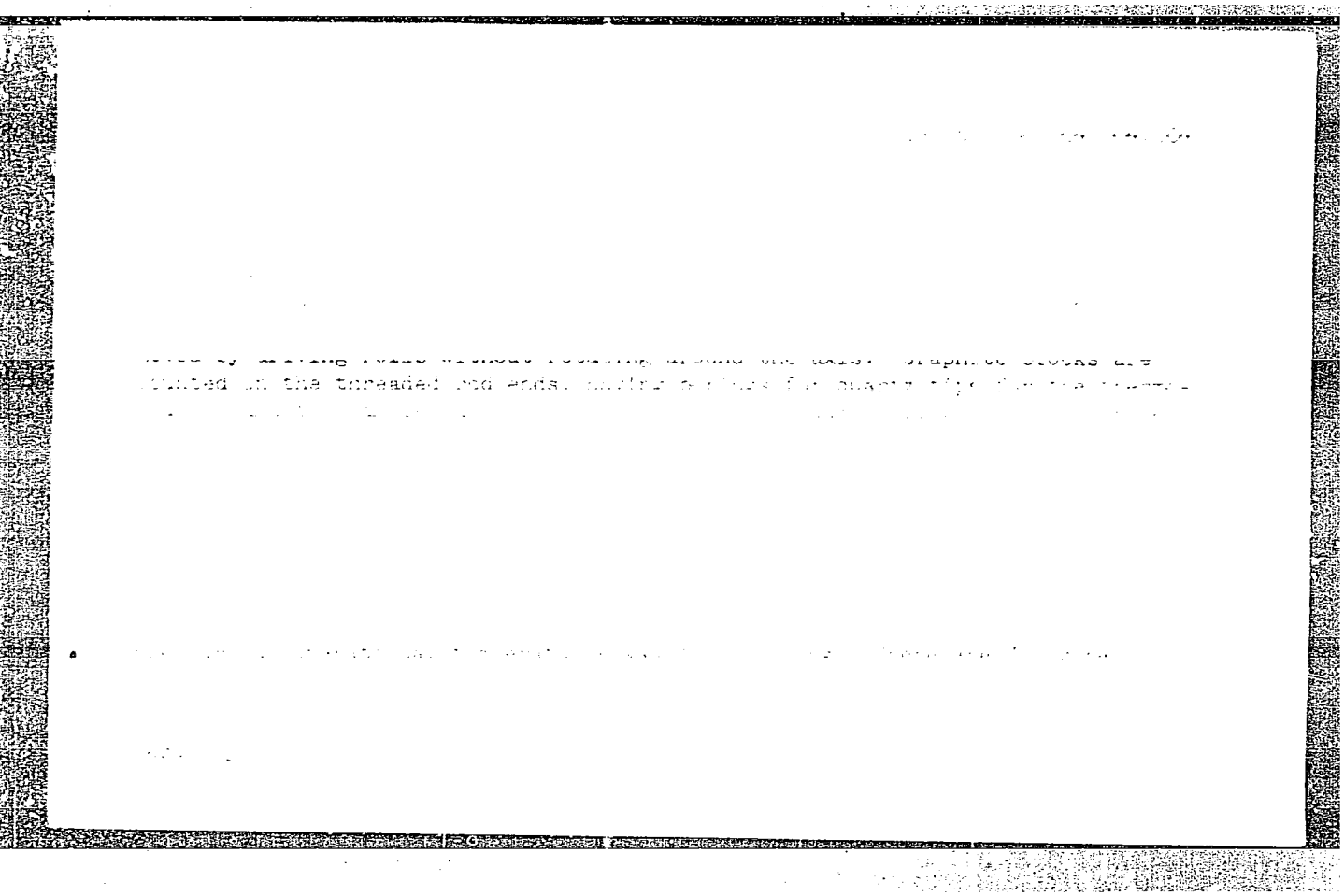
[illegible] are

Card 3/3

TULIN, N.A.; BASTRIKOV, N.F.

Lining of low-capacity electric arc furnace. Metallurg 7 no.12:13-15 D '62. (MIRA 15:12)
(Electric furnaces) (Refractory materials)

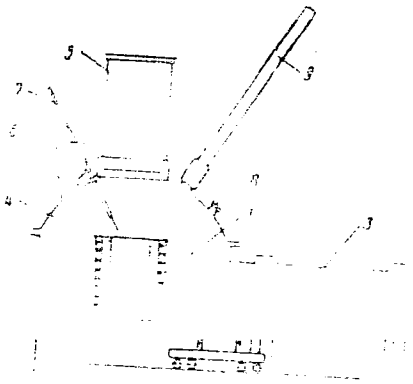




Assimilation of the...

Figure ... Schematic diagram ... vacuum furnace, type ...

Legend: 1 - crucible with three-section inductor; 2 - melting chamber; 3 - chamber for the supply and removal of molds; 4 - cover; 5 - charging device; 6 - portioning device; 7 - crowbar for jolting the charge; 8 - operating apertures; 9 - temperature measuring device.



AUTHOR: Privalov, N. T.; Yartsev, M. A.; Tulin, N. A.

TITLE: Improved technique in producing steel DI-1

SOURCE: Stal', no. 5, 1963, 426-429

TOPIC TAGS: steel DI-1, steel 20Kh15N3MA, steel Kh17N2, Cr, C, reduction of defective product

ABSTRACT: A new technique in production of stainless steel DI-1(whose composition is similar to that of steel 20Kh15N3MA) was introduced after numerous experiments. This new type of steel [illegible] former stainless steel Kh17N2 and has a number of advantages. The procedure of making steel Kh17N2 was applied [illegible]

Card 1/2

Procedure reduced the amount of defective metal produced at the mill by the ratio of 11, while the rejection of the product by the customer was halved. "The melts were made with assistance of engineers I. D. Donets, D. B Royak, N. F. Bastrikov, Yu. P. Anisimov, F. I. Shved, [illegible] Khmelev, A. A. Khuden'kikh, and M. Ye. Anisimov." Orig art has: 2 figures and 4 tables.

ASSOCIATION: none

SUBMITTED: 00

DATE ACQ: 10Jun63

ENCL: 00

SUB CODE: GO

NO REF SOV: 008

OTHER: 001

Card 2/2

18c 35 34 8

L 35031-65 EWT(m)/EWP(b)/EWP(t) JD S/0286/65/000/005/0034/0034

ACCESSION NR: AP5008155

AUTHOR: Paton, B. Ye.; Dudko, D. A.; Medovar, B. I.; Latash, Yu. V.; Maksimovich, B. I.; Shevchenko, A. I.; Stupak, L. M.; Goncharenko, V. P.; Grigor'yev, [illegible] F.; Petushov, G. K.; Chudin, N. I.; Lubenets, I. A.; Yartsev, M. A.; Keys, N. V.; Tulin, N. A.; Kapel'nitskiy, V. Q.; Privalov, N. T.; Pis'mennov, V. S.; Kholodov, Yu. A.; Bystrov, S. N.; Bastrakov, N. F.; Donets, I. D.; Silayev, A. Ya.

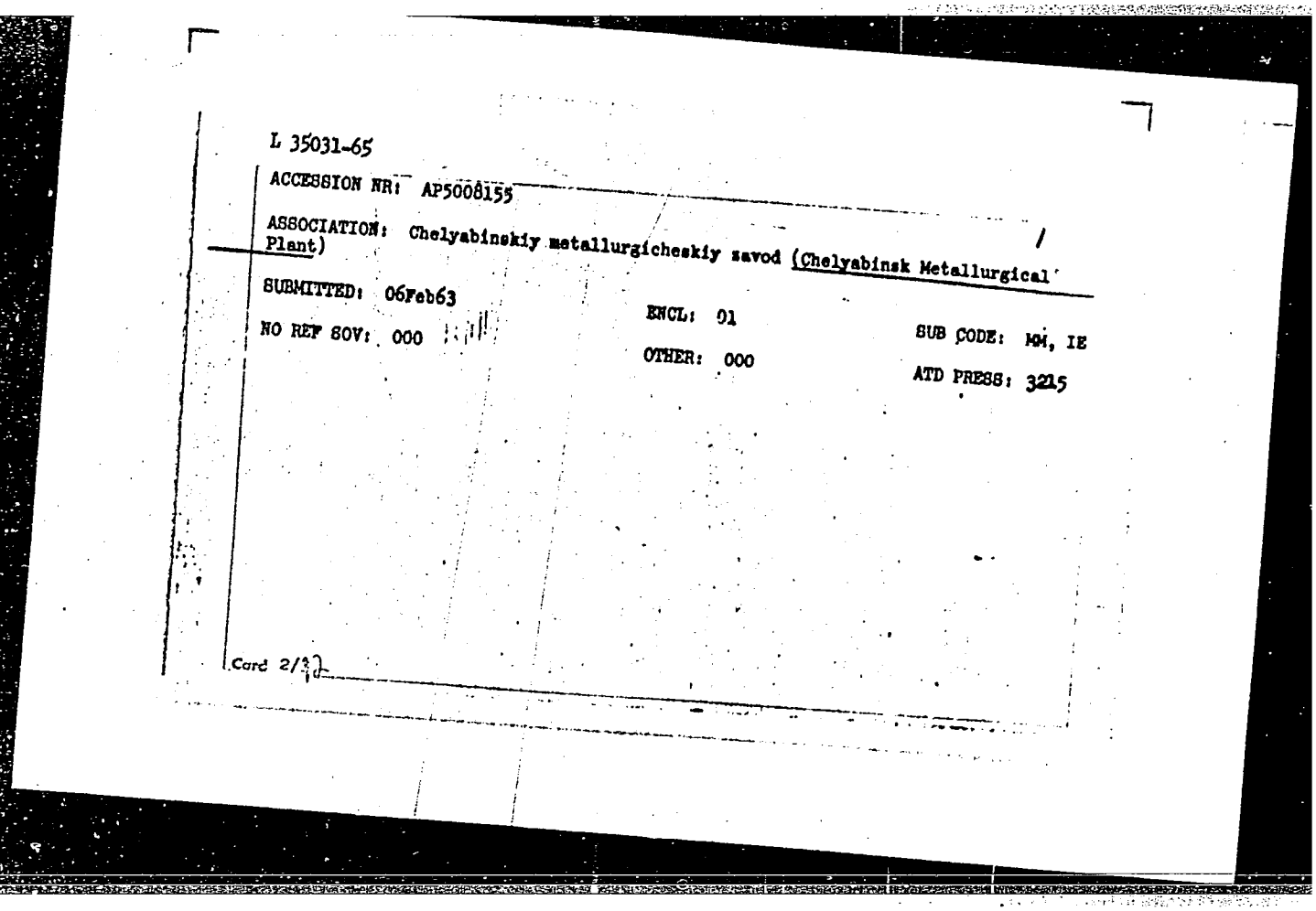
TITLE: Method of electroslag casting of ingots. Class 18, No. 168743

SOURCE: Byulleten' izobreteniy i tovarnykh znakov, no. 5, 1965, 34

TOPIC TAGS: ingot casting, ingot electroslag casting, electroslag melting, steel melting, alloy melting, metal melting

ABSTRACT: This Author Certificate introduces a method of electroslag casting of ingots in an open or protective atmosphere or in vacuum, in which slag is first melted in a mold with a nonconsumable or consumable electrode arc or plasma jet. To improve the metal quality and the ingot surface and to raise the yield, the molten metal or, if needed, the slag is poured into the mold through a hollow consumable or nonconsumable electrode (see Fig. 1 of the Enclosure). Orig. art. has: 1 figure. [ND]

Card 1/3



L 35031-65

ACCESSION NR: AP5008155

ASSOCIATION: Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant)

SUBMITTED: 06Feb63

ENCL: 01

SUB CODE: MM, IE

NO REF SOV: 000

OTHER: 000

ATD PRESS: 3215

Card 2/3

L 3992-66 EPA(s)-2/EWT(m)/EPF(n)-2/EWP(t)/EWP(b) IJP(c) JD/WW/JG

ACC NR: AP5022354 UR/0133/65/000/009/0820/0823
669.168:621.365

AUTHOR: Bazobrazov, S. V.; Kadarmetov, Kh. M.; Charushnikova, G. V.; Krichevets, B. B.; Ponomarenko, Yu. G.; Tulin, N. A.; Pozdeyev, N. P.; Sergeyev, A. B.

TITLE: Vacuum treatment of liquid ferrochromium

SOURCE: Stal', no. 9, 1965, 820-823

TOPIC TAGS: ferrochrome, low carbon ferrochrome, liquid ferrochrome, ferrochrome decarburization, vacuum decarburization

ABSTRACT: To develop a technique for industrial-scale production of low-carbon ferrochromium, the Chelyabinsk Scientific Research Institute of Metallurgy together with the Chelyabinsk Metallurgical Plant conducted (1960-1964) a series of laboratory and semi-industrial scale experiments on decarburization of liquid ferrochromium in a vacuum induction furnace. The experimental results showed that vacuum treatment of a 400-kg heat of liquid ferrochromium in an induction furnace in a vacuum of 0.6—2.0 mm Hg (80—270 n/m^2) at 1670—1700C reduced the carbon content of the alloy from 0.05—0.07 to 0.01—0.02% in 1 hr, and even lower with further treatment. The chromium content of the alloy was practically unchanged, and the loss of ferrochromium did not exceed 3%. The power consumption for vacuum treatment was about 500 kwh per ton of liquid ferrochromium, and the carbon oxidation rate was 0.0006 to 0.0009% C/min. In industrial-scale production, liquid ferrochromium can be poured into a ladle from which, after slag removal, the metal is poured into the crucible

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L 3992-66

ACC NR: AP5022354

of an induction furnace. The air is then evacuated from the furnace and after treatment the degassed metal is cast in flat ingots in air or in vacuum. To speed up the treatment, the crucible preferably should be of large diameter but comparatively shallow, and the content of carbon and phosphorus in the initial alloy should not exceed 0.07—0.09 and 0.03%, respectively. Orig. art. has: 1 figure and 1 table. [MS]

ASSOCIATION: Chelyabinskiy n.-i. institut metallurgii (Chelyabinsk Scientific Research Institute of Metallurgy); Chelyabinskiy metallurgicheskiy zavod (Chelyabinsk Metallurgical Plant)

SUBMITTED: 00 ENCL: 00 SUB CODE: MM,IE

NO REF SOV: 011 OTHER: 000 ATD PRESS: 4119

RC

Card 2/2

SMELOV, Sergey Petrovich, prof., doktor biolog.nauk; MOVSISYANTS, Agaron Pogosovich, kand.sel'skokhoz.nauk; TULIN, N.S., red.; GUREVICH, M.M., tekhn.red.

[Improvement and correct use of meadows and pastures] Uluchshenie i pravil'noe ispol'zovanie lugov i pastbishch. Moskva, Gos.izd-vo sel'khoz.lit-ry, 1959. 87 p. (MIRA 13:6)
(Pastures and meadows)

KAYBICHEVA, M.N., TULIN, N.A., BASTRIKOV, N.F., FEDEYEVA, N.T.

Wall blocks of electric steel-smelting furnaces made of magnesite-chromite brick wastes. Ogneupory 25 no.4:186-188 '60. (MIRA 13:8)
(Firebrick--Testing) (Chelyabinsk--Smelting furnaces)

MAKSIMENKO, Nikolay Vissarionovich, kandidat sel'skokhozyaystvennykh nauk; TULIN, N.S., redaktor; ZUBRILINA, Z.P., tekhnicheskiy redaktor

[Companion cropping] Uplotnennye posevy. Moskva, Gos. izd-vo sel'khoz. lit-ry, 1956. 52 p. (MLRA 10:3)
(Companion crops)

SUSLOV, V.M., otv.red.; VASIL'YEV, D.S., red.; GEYDEL'BERG, Ye.Z., red.; IGNAT'YEV, B.K., red.; MOSKALENKO, V.I., red.; PANCHENKO, A.Ya., red.; UMEN, D.P., red.; TULIN, N.S., red.; ANTONOVA, N.M., khudozh.-tekhn.red.

[Collection of scientific research papers on oilseed and aromatic plants] Sbornik nauchno-issledovatel'skikh rabot po maslichnym i efiromaslichnym kul'turam. Moskva, Izd-vo M-va sel'.khoz.SSSR, 1960. 284 p. (MIRA 14:3)

1. Krasnodar. Vsesoyuznyy nauchno-issledovatel'skiy institut maslichnykh i efiromaslichnykh kul'tur.
(Oilseed plants) (Aromatic plants)

TULIN, N.S.

SAVZDARG, V.R., red.; TULIN, N.S., red.; DOLINSKIY, M.M., red.; GRIGOR'YEV, A.I., red.; GOR'KOVA, Z.D., tekhn.red.

[Heroes of virgin lands; practices of subjugators of virgin lands in Kazakhstan, Siberia, Urals, and Volga Valley] Geroi tseliny; iz opyta pokoritelei tseliny Kazakhstana, Sibiri, Urala i Povolzh'ia. Moskva, Gos. izd-vo sel'khoz. lit-ry, 1957. 566 p. (MIRA 11:4)
(Reclamation of land)

Tulin, N.S.

SERGEYEV, P.A.; SHAIN, S.S.; KONSTANTINOVA, A.M.; GERASIMOVA, A.I.; MINYAEVA, O.M.; FEDOSEYEV, B.V.; TULIN, N.S., red.; GOR'KOVA, Z.D., tekhn. red.

[Growing red clover] Kul'tura krasnogo klevera. Moskva, Gos. izd-vo sel'khoz. lit-ry, 1958. 541 p. (MIRA 11:10)
(Clover)

TULIN, N.S.

BANNIKOV, P.A.; TULIN, N.S., red.; PEVZNER, V.I., tekhn.red.; ZUBRILINA, Z.P., tekhn.red.

[For good crops; practices of leading collective farms of Penza Province; a collection of articles] Za vysokie urozhai; iz opyta peredovykh khoziaistv Penzenskoi oblasti. Sbornik statei. Moskva, Gos.izd-vo sel'khoz. lit-ry, 1957. 166 p. (MIRA 11:2)
(Penza Province--Field crops)

SHEDEROV, Semen Georgiyevich, kandidat sel'skokhozyaystvennykh nauk; TULIN, N.S., redaktor; ZUBRILINA, Z.P., tekhnicheskiy redaktor

[The use of lime on turf-podzolic soils] Primenenie izvesti na dernovo-podzolistykh pochvakh. Moskva, Gos. izd-vo sel'khoz. lit-ry, 1956. 62 p. (MLRA 10:3)
(Lime) (Podzol)

ARINSHTEYN, A.I., kandidat sel'skokhozyaystvennykh nauk; TULIN, N.S., redaktor; TUREVICH, M.M., tekhnicheskiy redaktor.

[Producing high yields of hemp, ambary hemp, and jute; collection of articles] Vyrashchivanie vysokikh urozhaev konopli, kenafa i dzhuta; sbornik, statei. Moskva, Gos.izd-vo sel'khoz.lit-ry, 1957. 109 p. (MLRA 10:6)

(Fibers)

TULIN, S.A. [translator]; GRACHEV, S.I., polkovnik, obshchiy red.; ARTEMOV, A.P., mayor, red.; KNYAZEV, R.V., red.; MEDNIKOVA, A.N., tekhn.red.

[Birth of the Czechoslovakian Army; collection of articles] Rozhdenie chekhoslovatskoi Narodnoi armii; sbornik statei. Pod obshchei red. i s predisl. S.I.Gracheva. Moskva, Voen. izd-vo M-va oborony SSSR, 1959. 278 p. (MIRA 12:11)
(Czechoslovakia--Army)

PETROV, Vladimir Sergeyevich; TULIN, Sergey Alekseyevich; UKRAINSKIY, F.Ya., red.; SMUL'SKAYA, T.K., red.-leksikograf; AKSEL'ROD, I.Sh., tekhn. red.

[Russian-Czech polytechnical dictionary]Russko-cheshskii politekhnicheskii slovar'. Moskva, Glav.red. inostrannykh nauchno-tekhn. slovarei Fizmatgiza, 1962. 635 p. (MIRA 15:12)
(Russian language--Dictionaries--Czech)
(Technology--Dictionaries)

Tulin, S.N.

AUTHOR: Salikov, A.P. Candidate of Technical Sciences, and Tulin, S.N., Engineer. 110-6-13/24

TITLE: Tubes with wire fins of optimum dimensions for the gas coolers of electrical generators. (Trubki s provolochnym orebreniyem optimal'nogo razmera dlya gazookhladiteley elektricheskikh generatov.)

PERIODICAL: "Vestnik Elektropromyshlennosti"(Journal of the Electrical Industry) 1957, Vol.28,No.6, pp.45-49 (U.S.S.R.)

ABSTRACT: The gas coolers of hydrogen-cooled alternators are located in the rotor frame and so it is important to make them as small as possible. To increase the cooling surface of the tubes, spirals of wire are wrapped round them to form cooling fins. It is, therefore, necessary to determine the best way of making such fins, selecting the wire diameter, the number of loops per turn, the width and height of the loops and the pitch. With this aim the All-Union Thermo-technical Institute in collaboration with the Troitskiy Electro-mechanical Works (Troitskiy Elektromekhanicheskiy Zavod) (Engineers G.V. Vishnevskiy and V.I. Kokoreva) investigated the heat transfer and resistance of bundles of tubes with different designs of wire fins. As a result

Card 1/3

Tubes with wire fins of optimum dimensions for the gas coolers of electrical generators. (Cont.)

110-6-13/24

of the investigation a fin design was found which makes it possible to reduce the weight of the tubes by 30% and the size by 40% as compared with the tubes used until recently. The main dimensions of the three most successful designs of wire-fin tubes and of the old design are given in Table 1. The increase in the efficiency of the new tube as compared with the old is illustrated in Figs. 2 and 3, which give the characteristics of the air coolers for a 50-megawatt generator using the existing and the new tube designs. Similar comparisons are made in Table 2. Fig. 4 gives design curves for determination of the heat transfer coefficient using wire fin tubes of type No. 9, and Fig. 5 gives a curve for determination of the hydraulic resistance to flow over the outside of this type of tube. Similar curves for the other two improved types of tube are given in Figs. 6-9. Formulae are given for the preparation of similar curves for the hydrogen coolers of generators. The experimental data in respect of heat transfer to air for the old design of tubes is in agreement with the heat transfer curves used by the Elektrosila Works.

Card 2/3

Tubes with wire fins of optimum dimensions for the gas coolers of electrical generators. (Cont.)

110-6-13/24

The experimental data of the resistance of these tubes is somewhat higher than the works' figures, because in the present tests the tubes were somewhat closer than in the factory coolers.

There are 9 figures.

ASSOCIATION: All-Union Thermo-technical Institute. (Vsesoyuznyy Teplotekhnicheskiy Institut).

SUBMITTED: July 3, 1956.

AVAILABLE:

Card 3/3

TULIN, S.N.

AUTHOR: Tulin, S.N. (Engineer) 96-3-17/26

TITLE: Heat transfer and resistance in bundles of tubes with wire fins. (Teplootdacha i soprotivleniye v puchkakh trubok s provolochnym orebreniyem.)

PERIODICAL: Teploenergetika, 1958, Vol. 5, No.3. pp.67-72 (USSR)

ABSTRACT: Heat exchange apparatus with finned tubes is widely used but tubes with wire fins have so far been little used except in the gas coolers of alternators. This is mainly because they have been little studied. The wire finned tubes that have so far been used in alternator gas coolers are brass tubes of 17/19 mm diameter with copper wire fins 17.5 mm high as illustrated in Fig.1. These were manufactured without complete study and their geometry was evidently selected from constructional considerations. Little experimental work has been done on tubes with wire fins. The theory of the subject is briefly considered and the method of presenting the experimental data on heat transfer is discussed. Experimental work was undertaken at the All-Union Thermo-Technical Institute because of the need to economise non-ferrous metal in the manufacture of alternators. The construction of the tubes investigated is given in Table.1. and illustrated in Fig.3. An expression is derived for the heat transfer coefficient for the tubes. Various simplifying assumptions are described. The experimental graphs of Nusselt's number as a function of Reynold's Number on logarithmic co-ordinates are straight lines

Card 1/3

are straight lines. The slope of these lines is not the same for all bundles of tubes, but the differences are within the limits of experimental error. The influence of the ratios of the pitch of the loops, the height of the fins and the diameter of the main tube to the pitch of the fins is then considered. To study the influence of the ratio of the loop pitch to the fin pitch on the heat transfer, tests were made on four bundles of tubes, the geometrical characteristics of which are given in Table.2. The experimental results are given in Fig.4. and it will be seen that increase in the number of loops greatly reduces heat transfer. In order to investigate the influence of the ratio of the height of the ribs to their pitch on heat transfer, tests were made on three bundles of tubes, the characterists of which are given in Table.3. The test results are given in Fig.5. which shows that increase in the height of the ribs reduces the heat transfer coefficient. The influence of the ratio of the diameter of the main tube to the pitch of the fins, on the heat transfer, was studied by tests on three bundles of tubes, the characterists of which are given in Table.4. The test results are given in Fig.6. A special generalised formula was derived to express all the experimental results and it was used to plot Fig.7. The experimental results and the formula are in agreement to within ± 15%. A formula is recommended for

Heat transfer and resistance in bundles of tubes with wire fins. 96-3-17/26

practical calculations on wire finned pipes and the limits of its applicability are stated. This formula is claimed to give good agreement with data of the Central Boiler Turbine Institute as shown in Fig.8. The treatment of experimental data on resistance is then considered. Fig.9. shows the results of studies of the influence of the ratio of the loop pitch to the fin pitch on the resistance. Results for the ratio of the fin height to the fin pitch are given in Fig.10. Finally, a general resistance formula is given and is used to plot Fig.11. It is found that the experimental data agrees with the formula to within ± 13.5%. On the basis of the work formulae are recommended for the calculation of resistance in different cases. There are 11 figures, 4 tables, 5 literature references (Russian).

ASSOCIATION: All-Union Thermo-Technical Institute. (Vsesoyuznyy Teplotekhnicheskiy Institut).

AVAILABLE: Library of Congress.

Card 3/3

S/110/60/000/010/006/014
E194/E455

AUTHORS: Tulin, S.N., Engineer and
Salikov, A.P., Candidate of Technical Sciences

TITLE: The Heat Transfer and Resistance of Tube Bundles With Strip Ribbing

PERIODICAL: Vestnik elektropromyshlennosti, 1960, No.10, pp.33-36

TEXT: The All-Union Thermo-Technical Institute, in addition to investigating heat transfer and resistance in tube bundles with wire ribbing (Vestnik elektropromyshlennosti, 1957, No.6 and Teploenergetika, 1958, No.3), hasalso studied two tube bundles with strip ribbing, one made by the "Uralelektroapparat" Works and the second by TsNIITMASh. The "Uralelektroapparat" tubes are made of brass and have ribbing of corrugated copper foil 0,2 mm thick. The TsNIITMASh tubes are cold drawn of copper grade M-2. Tube dimensions and geometry are given. The experimental studies of heat transfer and hydraulic resistance in the ribbed tube bundles were made in an open wind tunnel of 270 x 300 mm. The bundles consisted of 44 vertical tubes arranges in eight rows, the tubes in

Card 1/3

S/110/60/000/010/006/014
E194/E455

The Heat Transfer and Resistance of Tube Bundles With Strip Ribbing

the bundles being arranged at the apexes of equilateral triangles. The distance between the ribbing of neighbouring tubes was 1 to 3 mm. All the tubes in the bundles served as calorimetric heaters using direct current. One measuring calorimeter was installed in each row. The instrumentation is described and the criterial relationship used in working out the results are given. The main test results are plotted and tabulated. The results that should have been expected on the basis of previously-published formulae were calculated and agreement with experiment was found to be good. In order to compare the two constructions with one another and with the wire-ribbed tubes of the "Elektrosila" Works and the All-Union Thermo-Technical Institute, a technical-economic calculation was carried out and the results are given. It is stated that the cold-drawn tubes use 50% more metal than the "Elektrosila" tubes. The saving of non-ferrous metal when using the tubes of the All-Union Thermo-Technical Institute is 22 to 36%. Water coolers built up of tubes of TsNIITMASh and wire ribbed tubes

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S/110/60/000/010/006/014
E194/E455

The Heat Transfer and Resistance of Tube Bundles With Strip Ribbing

of the All-Union Thermo-Technical Institute occupy the same space. There are 4 figures, 3 tables and 5 Soviet references.

SUBMITTED: December 24, 1959

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TULIN, S.N., inzh.; LOKSHIN, V.A., kand. tekhn. nauk; BATENIN, B.A., inzh.; DANILOV, I.A., inzh.

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E032/E414

AUTHOR: Tulin, V.A.

TITLE: Continuously Regulated Thermostat

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TEXT: In the determination of the acceleration due to gravity by means of gravimeters, the accuracy which can be achieved depends on the quality of the thermostat employed. The present author gives a description of the theory of a thermostat which was designed for this purpose at the Aerogravimetric Laboratory of the Institute of Physics of the Earth AS USSR. In this thermostat the heating coil was at the same time a resistance thermometer and the general arrangement employed is shown in Fig.1, in which R_4 represents the resistance of the heater. If it is assumed that the temperature coefficients of R_1, R_2 and R_3 are zero, then the off-balance signal Δu is given by

$$\Delta u = u\left[\frac{R_4(1+\gamma\delta t)}{R_4(1+\gamma\delta t)+R_3}-\frac{R_2}{R_1+R_2}\right],$$

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where γ is the temperature coefficient of R_4, δt is the difference between the temperature at balance and the temperature being measured and R_{4_o} is the resistance of the heater at balance. If it is assumed that $R_1 = R_2$ then $R_3 = R_{4_o}$ and

$$\Delta u = u_2 \frac{\gamma \delta t}{2(2 + \gamma \delta t)} \qquad (1)$$

The amplification coefficient $k = u/\Delta u$ is then given by

$$\frac{1}{k} = \frac{\gamma \delta t}{2(2 + \gamma \delta t)} \qquad (3)$$

This is the basic equation of an idealized thermostat. It is clear from this relation that δt is a function of the amplification coefficient only and is independent of changes in the external temperature. It follows that the system can be used

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to obtain as large a regulation coefficient as required, the regulation coefficient being given by

$$\Pi = \frac{d\Delta t}{d\delta t}$$

If the circuit is looked upon as a positive feedback loop, then in the "usual notation" $\beta = \Delta u/u = \gamma\delta t/2(2 + \gamma\delta t)$ and Eq.(3) can be rewritten in the form $k\beta = 1$. The curve representing the external temperature can always be looked upon as a sequence of very small rectangular steps. The author therefore considers the effect of a temperature step on the performance of the circuit shown in Fig.1. This is illustrated in Fig.2. To start with, it is assumed that at a time τ_1 the external temperature is reduced and hence the difference between the external and internal temperatures Δt is increased (Fig.2a). After a certain further interval of time, τ^*, this change will appear across the heater

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coil (Fig.2b) and will give rise to a reduction in its temperature, i.e. δt will increase to $\delta t'$ since δt_1 lies below the temperature corresponding to bridge balance. This in turn leads to an increase in β to β' (Fig.2B). Finally, u_{out} will increase from u_{out_1} to $u_{out_{max}}$ (Fig.2 2), which is determined by the non-linearity of the amplifier. The increase in the output voltage leads to increased heat dissipation in R_4 and its temperature increases (δt decreases). At the same time the quantity β is reduced. This reduction takes place until $k\beta_2 = 1$, when u_{out} stabilizes at u_{out_2}, which corresponds to the new required energy consumption. If it is assumed that in the range $u_{out_1} \leqslant u_{out} \leqslant u_{out_2}$ the amplification coefficient

remains constant, then $\beta_1 = \beta_2$ and $\delta_1 = \delta_2$, i.e. in spite of changes in the external temperature the integral temperature of the heater remains constant. The above considerations refer to an idealized arrangement. In the second part of the paper, the author

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discusses (qualitatively) a real arrangement. The resistances R_1, R_2 and R_3 which, as was pointed out above, should have small temperature coefficients, should be in the form of wire wound resistors. In practice they will have finite reactances which will introduce phase shifts into the off-balance signal relative to the applied signal. It is pointed out that the true equivalent circuit of the bridge is extremely difficult to construct because of the large number of factors involved. However, it can be stated that even for very small reactive components the phase shift may be large in the neighbourhood of the balance. A simple equivalent circuit considered is shown in Fig.3. Here two of the four branches have finite inductances. It is deduced from a consideration of this circuit that when the thermostat has a high regulation coefficient $\Pi = d\Delta t/d\delta t$, the reactances of the bridge must be chosen empirically. One of the simplest methods is to shunt one of the branches of the bridge by a capacitor and then plot the curve $\Pi = f(\Delta t)$ in order to verify that the regulation

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coefficient varies within permissible limits in the working range. If this is not so, then the amplifier characteristics must be altered. Particular attention must be paid to externally induced effects such as mains pickup. The amplification coefficient must be selected on the basis of the following considerations. The higher the amplification coefficient the lower δt, and for given relative instability of k with respect to the active parameters of the amplifier, the smaller the absolute oscillations in δt. It is argued that the amplification coefficient cannot be determined in advance since it depends on the design of the thermostat and must be chosen empirically. The present author has used an amplification coefficient of about 1000 with a regulation coefficient of 500 and a temperature difference of 32°. There are 6 figures.

ASSOCIATION: Akademiya nauk SSSR Institut fiziki Zemli (Academy of Sciences USSR Institute of Physics of the Earth)

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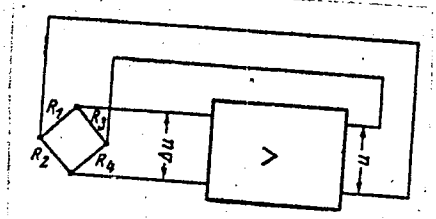
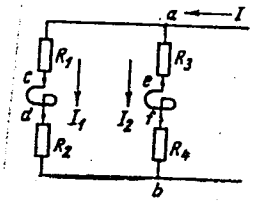
Fig.1.



Фиг. 1. Блок-схема термостата

Fig.3.



Фиг. 3. Упрощенная эквивалентная схема моста

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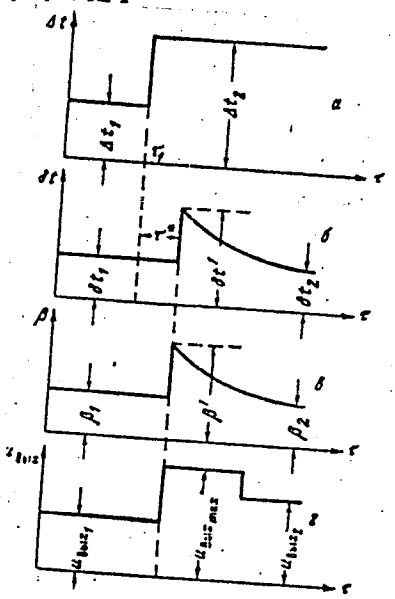

Фиг. 2. Эпюры температур, обратной связи и выходного напряжения

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